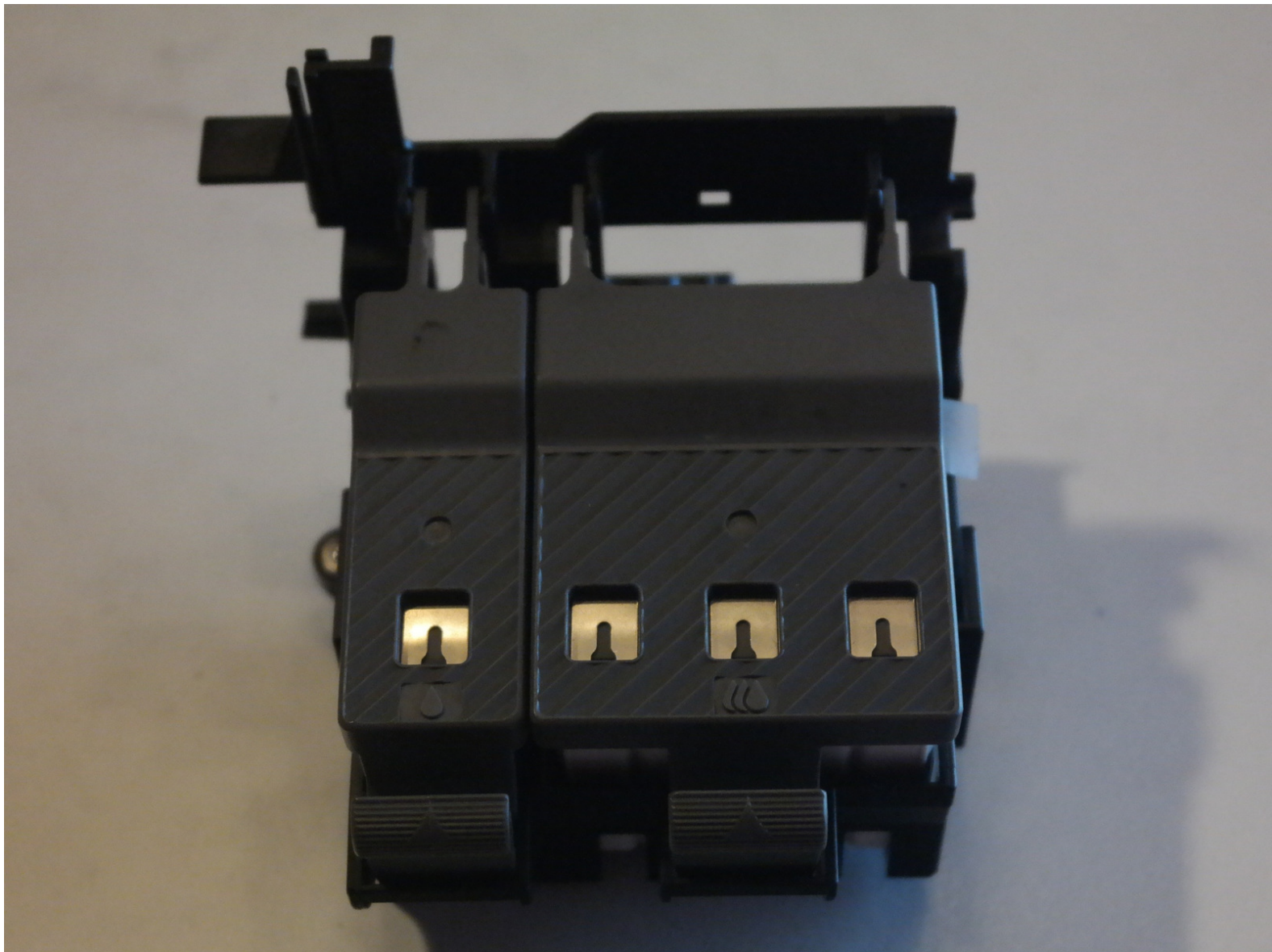




# Epson Stylus Printhead Teardown

Teardown of the most important part inside an inkjet printer.

Written By: jrw01



## INTRODUCTION

As a continuation of the [Epson Stylus Photo 820 teardown](#), this is a teardown of the printer's printhead.

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### TOOLS:

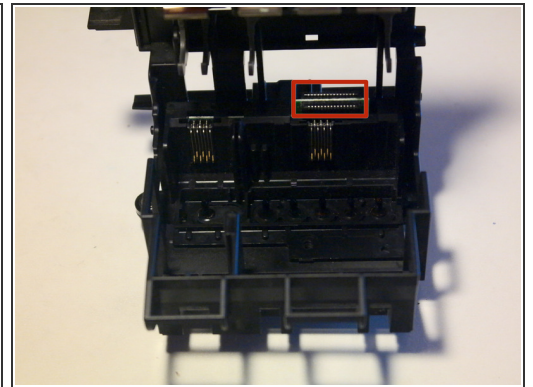
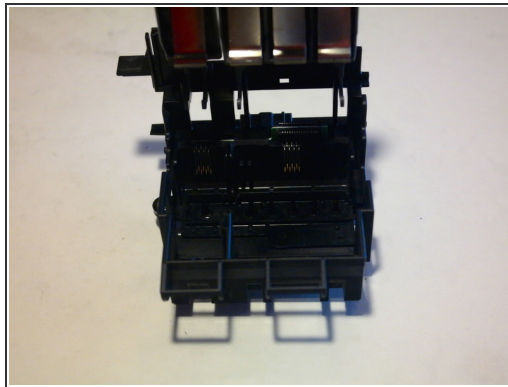
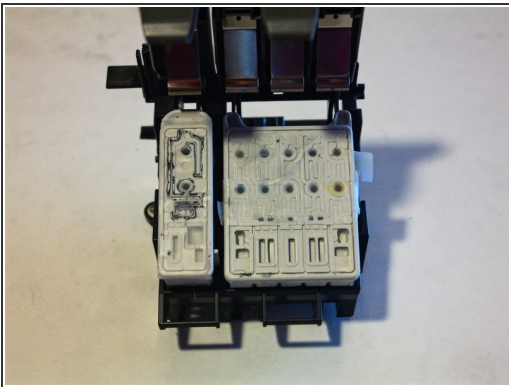
- [Phillips #1 Screwdriver](#) (1)
  - [Metal Spudger](#) (1)
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## Step 1 — Epson Stylus Printhead Teardown



- Here it is - the Epson Stylus Photo 820's printhead assembly.

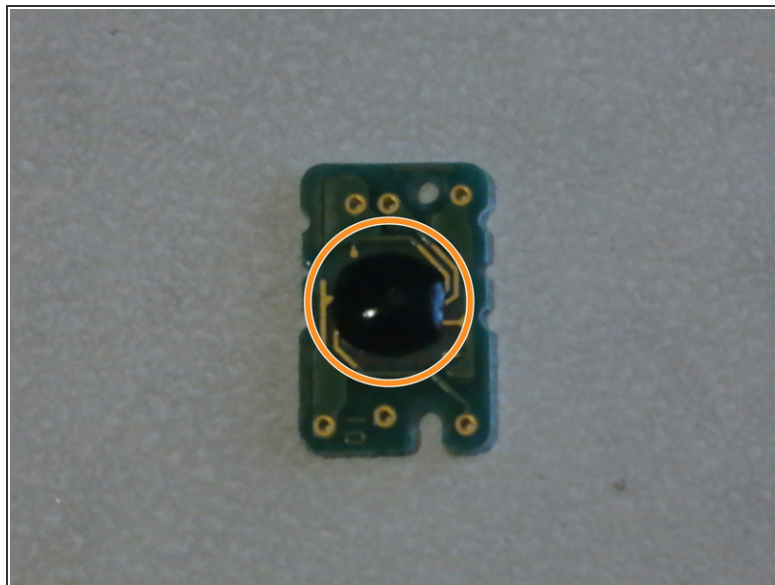
## Step 2



- The ink cartridges can easily be removed after opening up the cover. +10 for repairability as this is the only part that will need to be replaced.
- The dual ribbon cable connector can be seen hiding in the back of the printhead.

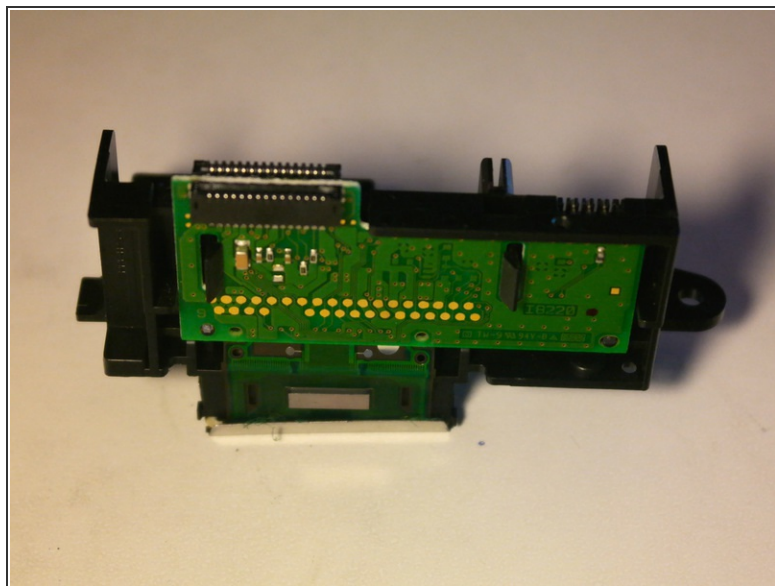
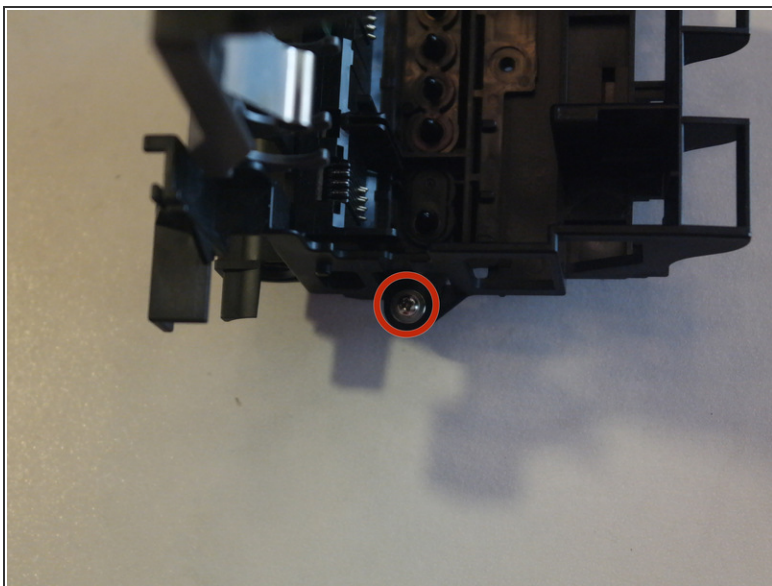


### Step 3



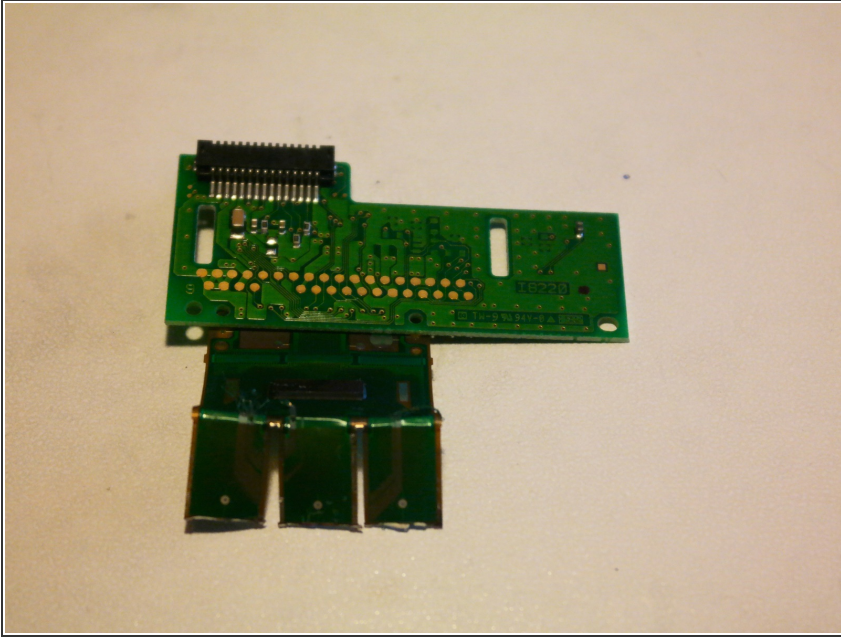
- Each ink cartridge has a tiny circuit board with 5 contacts which can easily be removed with a metal spudger or similar tool.
- On the other side of the board is a resin blob hiding a chip.

### Step 4



- Only one screw holds the printhead assembly together.
- And... The circuit board comes out!

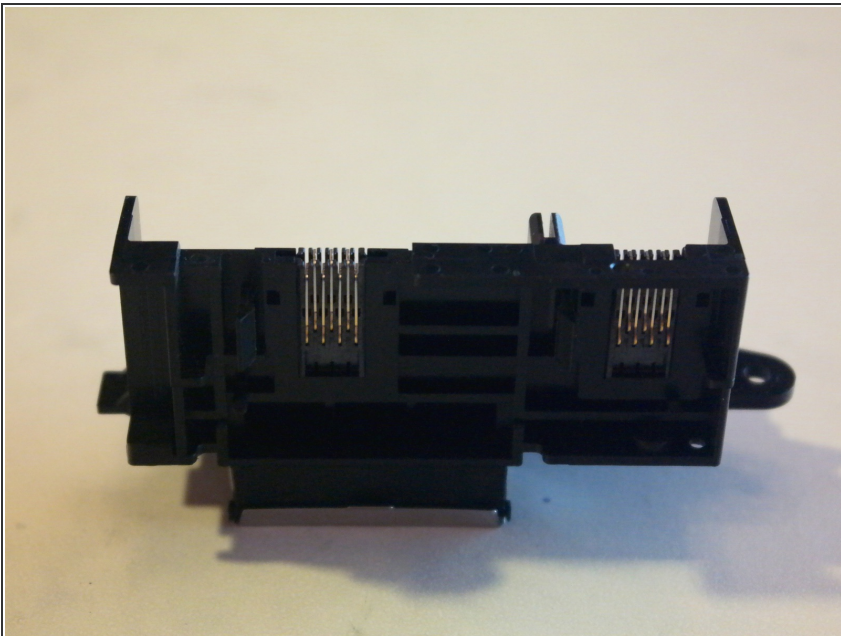
## Step 5



⚠ Houston, we have a problem.

- 3 very dense ribbon cables ripped off whatever they were attached too when the logic board was removed.
- ⓘ Hopefully, no one will have to repair one of these.

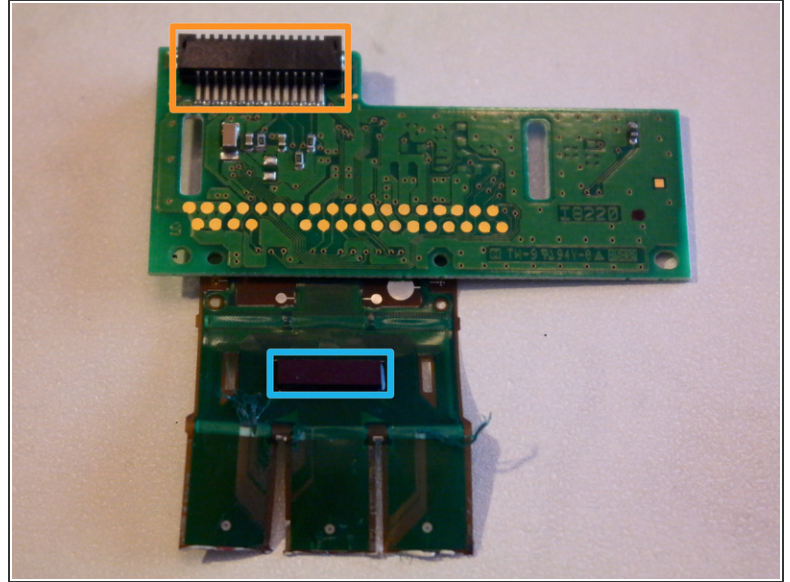
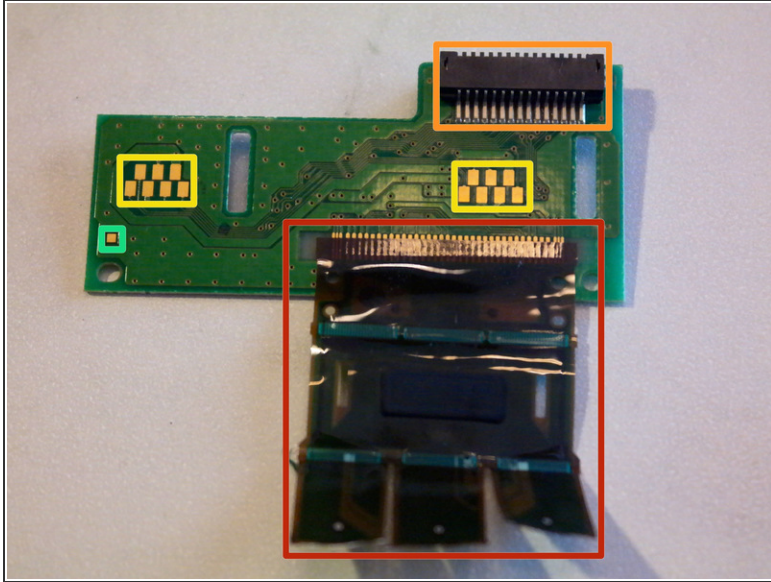
## Step 6



- All that is left in the plastic block is the 10 spring contacts that connect the ink cartridge chips to the main board.

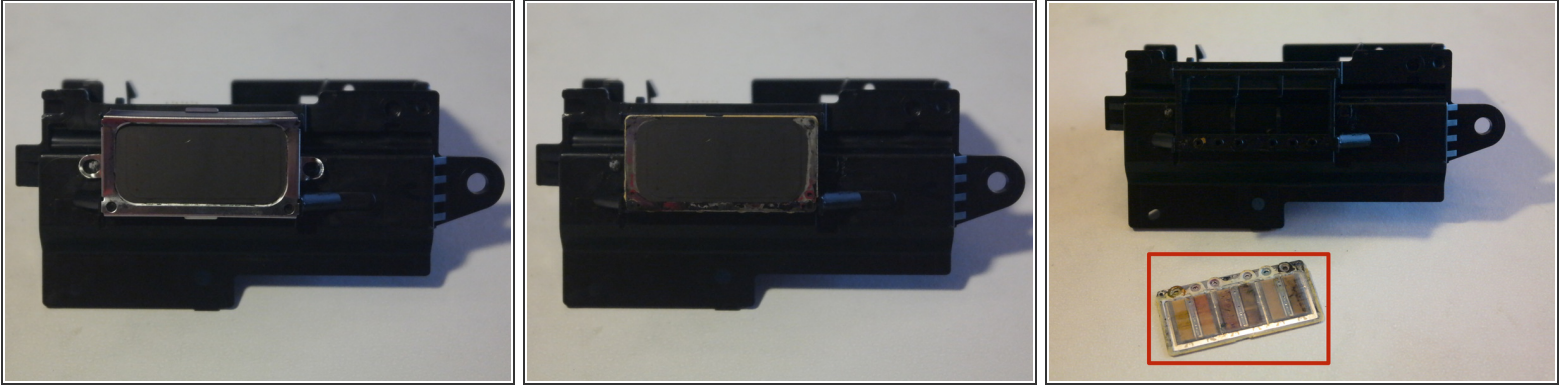


## Step 7



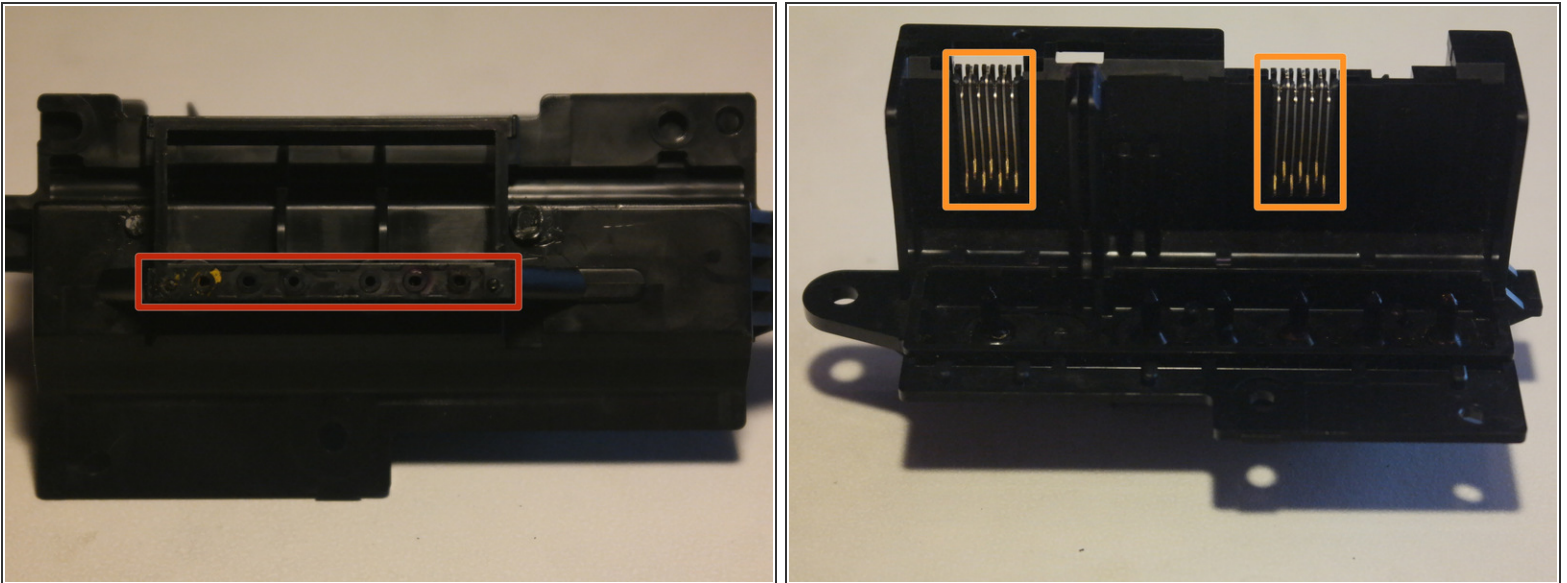
- Let's take a look at the circuit board.
- This flexible circuit connects the actual print head to the circuit board.
- The dual ribbon cable connector
- The contacts for the ink cartridge chips
- This appears to be a test point of some kind.
- This decoder/multiplexer chip on the flexible circuit appears to take 16 inputs and provides over 240 outputs for the print head.

## Step 8



- Finally. Time to get inside the print head.
- The print head is held in place by a metal cover that is held in place with blobs of melted plastic.
- This colorful assembly is the *actual* print head.

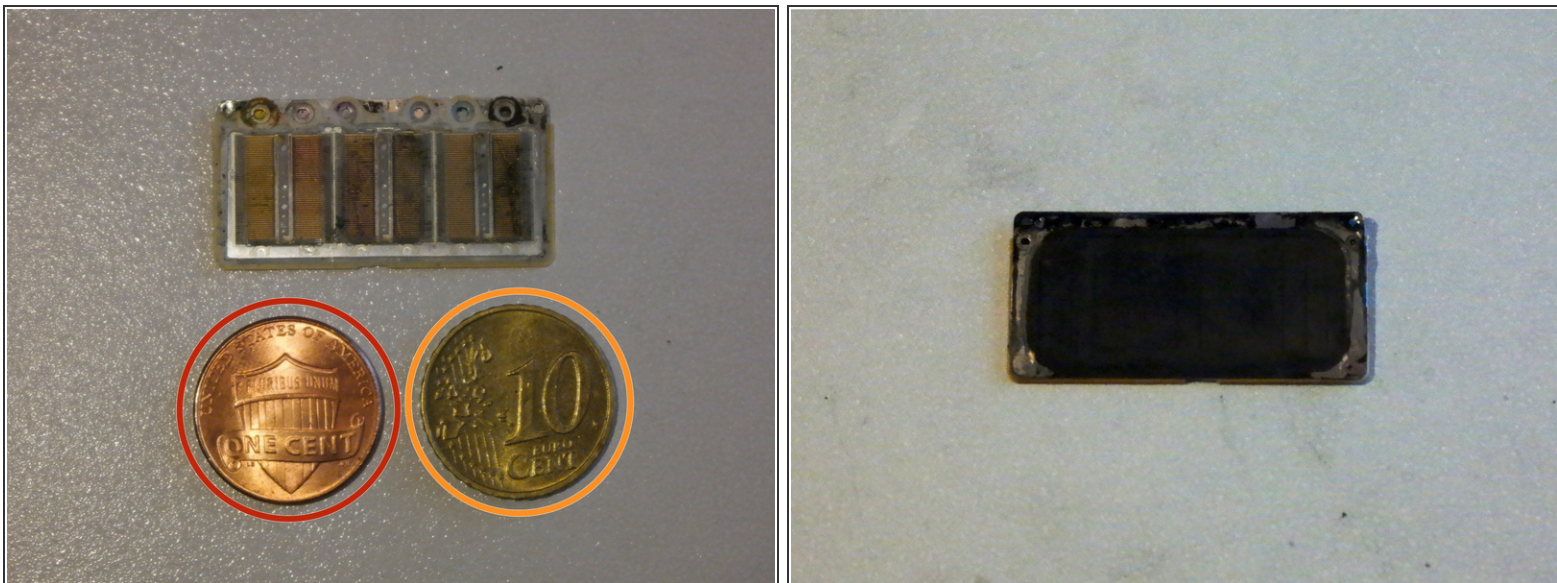
## Step 9



- This row of 6 holes is the end of the tubes that transfer ink from the cartridges to the print head.
- Here you can see the contacts for the cartridge chips.



## Step 10



- This is a close-up view of the most important part in any inkjet printer.
- Penny for scale
- 10 Euro Cent coin for scale
- For scale in the third dimension, the printhead is 0.3 mm (0.01 inches) thick.

## Step 11

# SCIENCE



with

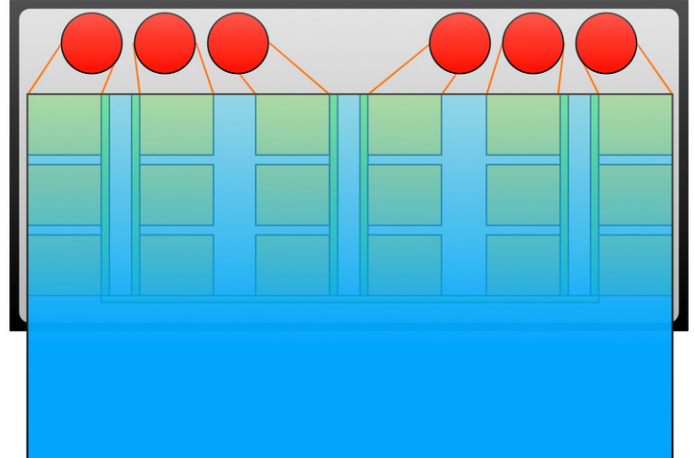
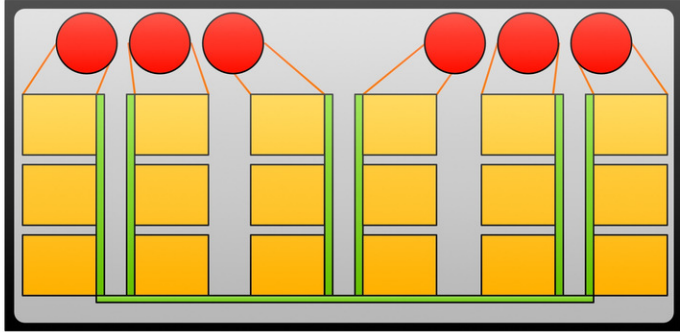


# jBot-42

- So, you may ask, how does this wafer-thin piece of metal that I call the printhead actually print?
- Time for Science with jBot-42!

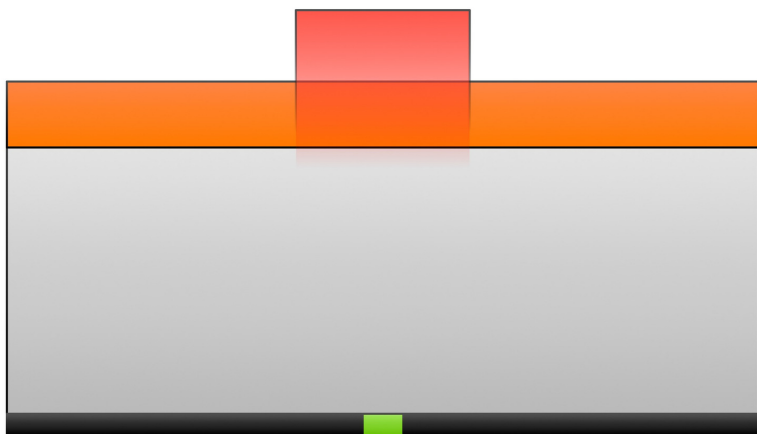


## Step 12



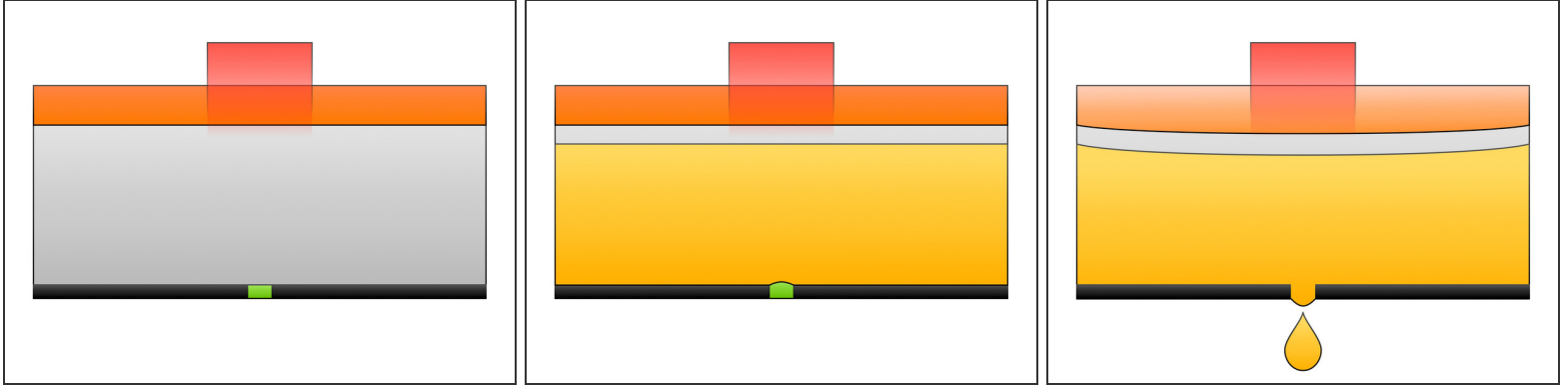
- Here is a color-coded diagram of how the printhead is built. The only difference is that there are 3 ink nozzles in a row instead of over 40.
- Ink flows from the cartridge into the printhead through the red circles.
- Ink flows into chambers underneath the piezo elements (marked by orange lines).
- Individually addressable piezo elements for each nozzle cover the ink chambers.
- The piezo elements are connected to a common ground by metal strips.
- (Second image) The ribbon cable (shown as a blue overlay) connects the other terminal of all the piezo elements to the multiplexer.

## Step 13



- Here is another view. The gray area in the middle is the ink chamber.
- The red rectangle (behind the orange) is the ink inlet.
- The orange rectangle is the piezo element.
- The green rectangle is the opening in the bottom that acts as the nozzle.

## Step 14



- Let's answer your last question about the printhead now: How does it print?
- The action starts in the second picture.
- The ink inlet fills the chamber with ink (yellow).
- The ink is prevented from exiting the nozzle by surface tension.
- (Third image) When the printer needs to print, electrical current is applied to the piezo element which expands, creates pressure, and forces a single drop of ink out of the nozzle.
- The (microscopic) drop of ink falls on the paper.
- The contraction of the piezo element causes the remaining ink in the nozzle opening to be sucked back into the chamber.
- Keep in mind that this printer has to control over 240 piezo elements which move over the paper many times in the time it takes to print a single page.



## Step 15

# Repairability Score:



9/10

- It is hard to give a bad repairability score to this device, because only one part of it will need to be replaced.
- The ink cartridges are very easy to replace (as they should be).
- The entire assembly is held together by one screw.
- The actual print head is very delicate and is too small to be repaired, so if it breaks the entire printer will have to be replaced.
- Update: I have now granted a repairability score to the [Epson Stylus 820 Photo printer](#).

To reassemble your device, follow these instructions in reverse order.

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